In the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application.

The Listing of Claims:

1. (currently amended) A thermoelectric device comprising:

at least one unipolar couple element having first and second legs of a same electrical conductivity type;

a first-temperature stage connected to the first leg wherein the first temperature stage is configured to function as one of a heat-source or a heat drain;

a second-temperature stage connected across the first and second legs of the at least one unipolar couple element; and

a third-temperature stage connected to the second leg, wherein the first leg is between the first-temperature stage and the second-temperature stage, and wherein the second leg is between the second-temperature stage and the third temperature stage wherein the third temperature stage is configured to function as the other of a heat source of a heat drain.

2. (currently amended) ~~The device of claim 1,~~ A thermoelectric device comprising:

at least one unipolar couple element having first and second legs of a same electrical conductivity type;

a first-temperature stage connected to the first leg;

a second-temperature stage connected across the first and second legs of the at least one unipolar couple element; and

a third-temperature stage connected to the second leg, wherein the first leg is between the first-temperature stage and the second-temperature stage, and wherein the second leg is between the second-temperature stage and the third temperature stage,

wherein said at least one unipolar couple element is configured such that currents flow in opposite directions in the ~~two~~ first and second legs of the same electrical conductivity type of the at least one unipolar couple element to establish a temperature differential across each of the first and second legs of said unipolar couple element.

3. (withdrawn) The device of claim 1, wherein said at least one unipolar couple element is configured to generate at least one of an electrical potential and an electrical current from a temperature differential established across the first and second legs of said unipolar couple element.

4. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprise respective first and second p-type Bi_2Te_3/Sb_2Te_3 superlattice thermoelements.

5. (previously presented) The device of claim 4, wherein the first and second p-type Bi_2Te_3/Sb_2Te_3 superlattice thermoelements have a ZT of >1 at 300K.

6. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprise respective first and second n-type $Bi_2Te_3/Bi_2Te_{3-x}Se_x$ superlattice thermoelements.

7. (original) The device of claim 8, wherein the n-type $Bi_2Te_3/Bi_2Te_{3-x}Se_x$ superlattice thermoelements have a ZT >1 at 300K.

8. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprise respective first and second n-type PbTeSe/PbTe superlattice thermoelements.

9. (previously presented) The device of claim 8, wherein the first and second n-type PbTeSe/PbTe elements comprise respective first and second n-type PbTeSe/PbTe quantum-dot superlattice thermoelements having a ZT of ~1.6 at 300K.

10. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprise respective first and second p-type PbTeSe/PbTe superlattice thermoelements.

11. (previously presented) The device of claim 1, wherein the at least one unipolar couple element comprises a first unipolar couple element having the first and second legs comprising respective first and second p-type thermoelements, and wherein the at least one unipolar couple element comprises a second unipolar couple element having first and second n-type thermoelements.

12. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprise respective first and second p-type thermoelements, and wherein the at least one unipolar couple element further comprises-two independent legs of n.

13. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprise respective first and second n-type thermoelements, and wherein the at least one unipolar couple element further comprises two independent legs of p.

14. (previously presented) The device of claim 1, wherein the first and second legs of the unipolar couple elements comprise respective first and second p-type bulk thermoelements.

15. (previously presented) The device of claim 1, wherein the first and second legs of the unipolar couple elements comprise respective first and second n-type bulk thermoelements.

16. (previously presented) The device of claim 1, wherein the at least one unipolar couple element is configured to produce temperature differentials in a range from 1K to 200K.

17. (previously presented) The device of claim 1, further comprising:

a thermal insulation between said first-temperature stage and said third-temperature stage wherein the first and second legs of the same electrical conductivity type and the first-

temperature stage and the third-temperature stage are on a same side of the second-temperature stage.

18. (original) The device of claim 17, wherein the thermal insulation comprises at least one of aerogels and polymer sheets.

19. (original) The device of claim 1, further comprising:

a controller configured to control a temperature of the second-temperature stage to produce desired source and drain temperatures on the first-temperature stage and the third-temperature stage, respectively.

20. (original) The device of claim 19, wherein said controller is configured to control said current flow to produce said desired source and drain temperatures.

21. (previously presented) The device of claim 2, wherein said temperature differential across each of the first and second legs is about half a temperature differential between the first-temperature stage and the second-temperature stage.

22. (previously presented) The device of claim 1, wherein at least one of the first-temperature stage and the second-temperature stage comprises a split stage.

23. (original) The device of claim 1, wherein said third-temperature stage is configured to operate at a temperature about 100 C so that a phase change of water to steam provides heat removal and said first-temperature stage is configured to operate at a temperature below 40 C.

24. (previously presented) The device of claim 1, wherein said third-temperature stage is configured to operate at a temperature about 100 C so that a phase change of water to steam provides heat removal and said first-temperature stage is configured to operate at a temperature below 10 C or below.

25. (original) The device of claim 1, further comprising:

a water-based closed cycle heat removal system connected to the third-temperature stage.

26. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprise respective first and second p-type thermoelements with the first and second p-type thermoelements having at least one of different material compositions and different structures.

27. (previously presented) The device of claim 26, wherein the first and second p-type thermoelements respectively comprise a p-type $Bi_{1.0}Sb_{1.0}Te_3$ thermoelement and a p-type $Bi_{0.5}Sb_{1.5}Te_3$ thermoelement.

28. (previously presented) The device of claim 26, wherein the p-p couple comprises: first and second p-type thermoelements respectively comprise a p-type 10 Angstrom/30 Angstrom Bi_2Te_3/Sb_2Te_3 superlattice thermoelement and a p-type 10 Angstrom/50 Angstrom Bi_2Te_3/Sb_2Te_3 superlattice thermoelement.

29. (previously presented) The device of claim 1, wherein the first and second legs of the at least one unipolar couple element comprises: comprises respective first and second n-type thermoelements with the first and second n-type thermoelements having at least one of different material compositions and different structures.

30. (currently amended) The device of claim 29, wherein the ~~the~~ first and second n-type thermoelements respectively comprise an n-type $Bi_2Te_{2.5}Se_{0.5}$ thermoelement and an n-type $Bi_2Te_{2.85}Se_{0.15}$ thermoelement.

31. (currently amended) The device of claim 29, wherein the ~~the~~ first and second n-type thermoelements respectively comprise an n-type 10 Angstrom/30 Angstrom $Bi_2Te_3/Bi_2Te_{2.85}Se_{0.15}$ superlattice thermoelement and an n-type 10 Angstrom/50 Angstrom $Bi_2Te_3/Bi_2Te_{2.85}Se_{0.15}$ superlattice thermoelement.

32. – 55. (canceled)

56. (currently amended) ~~The device of claim 1,~~ A thermoelectric device comprising:

at least one unipolar couple element having first and second legs of a same electrical conductivity type;

a first-temperature stage connected to the first leg;

a second-temperature stage connected across the first and second legs of the at least one unipolar couple element; and

a third-temperature stage connected to the second leg, wherein the first leg is between the first-temperature stage and the second-temperature stage, and wherein the second leg is between the second-temperature stage and the third temperature stage,

wherein the at least one unipolar couple element is configured such that currents flow in opposite directions in the ~~two~~ first and second legs of the same electrical conductivity type of the at least one unipolar couple element.

57. (previously presented) The device of claim 56, wherein the first and second legs of the same electrical conductivity type and the first-temperature stage and the third-temperature stage are on a same side of the second-temperature stage, and wherein the first-temperature stage and the third temperature stage are spaced apart.

58. (previously presented) The device of claim 56, wherein the first and second legs of the same conductivity type comprise respective first and second materials wherein the first and second materials are different.

59. (previously presented) The device of claim 56 wherein the first and second legs of the same conductivity type have respective first and second structures wherein the first and second structures are different.

60. (previously presented) The device of claim 56 wherein the first and second legs of the same conductivity type comprise respective first and second superlattice thermoelements having respective first and second superlattice periods wherein the first and second superlattice periods are different.

61. (previously presented) The device of Claim 56 wherein the first leg comprises a p-type $Bi_{1.0}Sb_{1.0}Te_3$ thermoelement, and wherein the second leg comprises a p-type $Bi_{0.5}Sb_{1.5}Te_3$ thermoelement.

62. (previously presented) The device of Claim 56 wherein the first-temperature stage and the second-temperature stage are spaced apart, wherein the second-temperature stage and the third-temperature stage are spaced apart, and wherein the first-temperature stage and the third-temperature stage are spaced apart.

63. (new) The device of claim 1, wherein said at least one unipolar couple element is configured such that currents flow in opposite directions in the first and second legs of the same electrical conductivity type of the at least one unipolar couple element to establish a temperature differential across each of the first and second legs of said unipolar couple element.

64. (new) The device of claim 1, wherein the at least one unipolar couple element is configured such that currents flow in opposite directions in the first and second legs of the same electrical conductivity type of the at least one unipolar couple element.